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AMERICAN COLOCYNTH.

By L. E. Sayre, University of Kansas.

A few months ago there was brought to the University a sample of fruit, which, it was stated, was interesting from a medical standpoint. The donor, Judge J. S. Emery, of Lawrence, Kansas, President of the National Irrigation Association, had just returned from a visit to California and New Mexico, and this specimen he said was given to him by a "very intelligent gentleman," connected with the Canaigre works at Deming, New Mexico, who had raised it himself, as an experiment. The fruit on examination proved to be an excellently developed gourd of Colocynth. My interest was at once excited, and a correspondence with the original donor, whose name was then unknown, being desired, a letter regarding the specimen was addressed immediately to the Superintendent of the Canaigre works at Deming, which, to my surprise, brought a reply from an old acquaintance and classmate, Mr. Charles B. Allaire, Ph.G., Class of '67, Philadelphia College of Pharmacy.

In this reply Mr. Allaire stated that the "fruit was raised from Trieste seed obtained from Dr. Squibb, Brooklyn," who asked him, in making agricultural experiments, to compare the fruit resulting from this seed with that of the imported article from Trieste, and to point out any differences which might arise from variation of climate. Mr. Allaire also stated that "there were from 65 to 80 melons per vine," and that he might have had many more but for the frost, as the vine was full of flowers and embryo fruit when frost came. In a subsequent letter he said, "I thought you might be surprised at the size of the apples. I do not know under what con-

ditions they grow in Europe. These were watered freely, and were much larger than those grown with ordinary rainfall. I don't think there can be any contamination, unless from a melon patch a long distance off, and beyond the influence of our prevailing winds, which are from the west."

Mr. Allaire at a later date sent an invoice of the fresh Colocynth apples, 7 in number. These, as taken from the package, had the following circumference measurements (the first figures representing vertical and the second horizontal measurements):

(1) 13 x 13½ in.; (2) 23½ x 24; (3) 22¼ x 22½; (4) 18 x 19; (5) 20¼ x 20½; (6) 18¾ x 18; (7) 21 x 21¼.

The exterior had a marbled green surface. The interior exhibited a rind about ½ inch thick, enclosing a white spongy pulp, imbedded in which were numerous seeds. A section parallel to the axis showed vertical rows of seeds upon fleshy parietal placentæ, which, on transverse section, were seen to project to the centre of the fruit, then divide and turn back, making convoluting branches directed one toward the other. This structure made apparent three distinct wedges, each of which seemed to have two divisions bearing the dark brown, almost black, seeds. Here and there were found white, perhaps unripe, seeds. The fruit gave forth an odor not unlike that of cucumber, also suggesting that of watermelon.

The accompanying figures (see Frontispiece) show the whole fruit, a tranverse and longitudinal section of the same, an enlarged section of the rind and pulp, and the stem and leaves of the plant as they were sent to me.

The principal differences between the gross characters of this fruit and the imported article is that of size, and a correspondingly larger number of seeds which are larger in proportion and darker than those of the foreign grown colocynth. In the imported fruit there are usually from 200 to 300 seeds, while the average number in the American is from 500 to 600. Physiological experiments upon the powder seemed to indicate that the American colocynth was only about two-thirds as powerful in cathartic action as that of the Trieste fruit. To give some idea of the weight, I would here state that apple No. 6 weighed 1,101 grams; the rind from this 693 grams, and the seeds 13·42 grams. The pulp weighed 394·58 grams, which when dried at a temperature not exceeding 50° C., to constant weight, yielded 31·75 grams, thus showing a loss of moisture of

91·92 per cent. The powder from the dried pulp was light in color, resembling the powder from the Indian fruit, and like the latter very bitter; the dust arising from it irritating to the eyes and nostrils, but differing considerably from the other in density, being much more compact and less fluffy.

As time has permitted, I have endeavored to make a comparison between this American Colocynth, and that of the Trieste fruit of the market by a somewhat crude analysis. A complete analysis of the two products for the purposes of comparison was deemed unnecessary, but a less complicated scheme was adopted, which it was thought not only accomplished the purpose, but was best suited to the comparatively small quantity of the dried pulp I found myself in possession of, after proper desiccation of the fresh apples had taken place.

Incidentally I might here mention that an attempt was made to dry the whole unbroken, decorticated apples, in the open air, by suspending them in open frames made of string. The air was warm and a good current stirring, but, after drying, on cutting open the shrivelled and apparently dry apples, there appeared in the somewhat damp interior, patches of black and white mould, which so penetrated into the tissue as to make the drug valueless. Suspending the unbroken and peeled fruit over a coil of steam pipe, in a perfectly dry room, free from dust, gave the same result. To dry the pulp successfully, I found it best to cut the pulpy mass into thin slices and lay these upon porcelain plates in a hot-air oven, kept at the temperature of about 50° C. From what I can learn of the collection and drying of the fruit in India, it is a matter of no difficulty to accomplish the latter there in the open air; but all attempts to dry either the whole or peeled fruit here in the atmosphere, proved a failure on account of the insidious growth of saprophytic fungi—principally the omniverous *mucor* and *penicillium*.

Returning to the analysis, I have said a simple method was adopted which seemed to be sufficient for the purpose of making comparison with the foreign fruit. The dry pulp, deprived of seeds, was reduced to powder and treated with various solvents, the extracts from which were weighed and carefully examined, according to details given below. In this way were obtained (1) an ether-chloroform extract; (2) an alcoholic extract from dregs from 1; (3) an aqueous extract of dregs from 2. Determinations were made of the various extractives for

sugar, gum, fat, resin, amyloid and albuminous substances, cellulose and ash.

A separation of the bitter principle, *colocynthin*, was thought might furnish valuable means of ascertaining the relative value of the American Colocynth, but unfortunately for the isolation of this principle there seems to be no process which in the hands of the analyst will yield uniform and reliable results. Test experiments with the commercial powdered colocynth, for the purpose of verifying Waltz's, Henke's, and the method suggested by George Wagner (*Proc. Amer. Pharm. Asso.*, 1893, p. 179), were made. But in no case (operating on small quantities) could such uniform results be obtained as would recommend either of the processes for the purpose in hand. That is, either process with the same powdered Colocynth yielded variable results; three trials, for example, were made with each process, using the same drug each time, and the three results were so variable that I could not depend upon them for my purposes. This I presume was largely due to the want of skill on my part.

The details of the analysis may briefly be stated as follows:

(*I*) *Resin, Fat, etc.*—By the use of a continuous extraction apparatus a chloroform-ether extractive was made. The ethereal liquid evaporated; the extractive treated with petroleum spirit which latter solution, when evaporated and weighed, was noted as fat. The residue treated with alcohol and the alcoholic solution evaporated; this precipitated by water; the precipitate, collected and weighed, was noted as resin.

(*II*) *Reducing substances* (*sugar?*)—An alcoholic solution of the dregs from *I* was made; the amount of total extractive thus obtained was noted, and an aqueous solution of the extract was treated with Fehling's solution, and the quantity of sugar thus indicated was noted as reducing substances. It may be stated incidentally that this alcoholic solution when concentrated was entirely soluble—not precipitated—in water.

(*III*) *Gum.*—A cold, aqueous solution, followed by a warm aqueous percolation of the dregs from *II*, was then made. The concentrated aqueous solution was precipitated by the addition of two volumes of alcohol. The precipitate collected, dried, weighed, incinerated and again weighed; this weight was noted (that is the differences between the last two weights) as gum.

(*IV*) *Amyloid Principles.*—The dregs from *III* were treated with water acidulated with sulphuric acid for six hours, and the solution tested quantitatively for sugar. The result multiplied by ·9 was noted as amyloid substance.

(*V*) *Cellulose.*—The dregs from *IV* were first treated with alkaline water (2 per cent. KOH) washed with water, then with ether and alcohol, the dried residue weighed, ignited and again weighed; the weight was noted (that is the difference between the last two weights) as cellulose.

(*VI*) *Albuminoid Principles.*—By the Kjeldahl method the nitrogen was determined, which, by the usual factor, was converted into albumen.

An hydro-alcoholic extract, using the official menstruum, was also made.

Parallel determinations of these extracts and constituents were made with the powder of the dried pulp of the imported fruit.

SUMMARY OF ANALYSIS.

Comparing the American with the imported colocynth. Percentages calculated from oven-dried powder:

	Extracts and Constituents.	Imported.	American.
(I)	Ether-chloroform extract,	3·21	4·62
	(a) Fat. (Petroleum-ether extract from I),	1·11	·521
	(b) Resin from I, soluble in alcohol and precipitated by water,	·64	·48
(II)	Alcoholic extract (of dregs from I),	16·61	23·23
	Principles acting as reducing sugar in II,	2·15	10·31
(III)	Aqueous extract,	31·07	24·69
	Gum (precipitated from III),	9·36	12·61
(IV)	Amyloid principles (in dregs of III),	2·07	2·34
(V)	Cellulose,	13·5	14·76
(VI)	Albuminous (protein) compounds,	14·31	14·69
(VII)	Ash,	9·76	6·01
(VIII)	Moisture (in air-dry powder)*,	6·8	7·9
	Diluted alcoholic (official) extract,	32·68	38·87

*What is meant here by air-dry powder, with reference to American Colocynth, is a powder dried at as low temperature as possible—not dried to constant weight. It may be said that the fresh pulp, deprived of seeds, contained about 92 per cent. of moisture.

It may be stated that the aqueous extract (*III*) was scarcely bitter, most all of the bitter principles being extracted by the solvents *I* and *II*. I regret that the quantity of powder left after the above treatment was not sufficient to make it worth while to continue the effort to isolate the bitter principle, Colocynthin. I hope to do this

at a future time, when I may be fortunate enough to discover a simpler and more wieldy method than that referred to, and when I may obtain a fresh supply of the American Colocynth.

As a result of this crude analysis, I would say, in closing, that I am of the opinion that the watermelon patch, although quite remote from the bitterapple patch, must have had a slight influence upon the product of the latter. *Lawrence, Kan.*

THE SOLUBILITY OF RESIN OF PODOPHYLLUM IN CONNECTION WITH THE TESTS OF THE UNITED STATES PHARMACOPŒIA, 1890.

By J. B. Nagelvoort.

Contribution from the Pharmaceutical Laboratory of Parke, Davis & Co.

American pharmacy is under obligation to Mr. Geo. M. Beringer for the courageous expression of his opinions in his "Critical Review of the Seventh Decennial Revision of the Pharmacopœia of the United States." The figures, by which he proves that the Pharmacopœia bears, on p. 338, an erroneous statement, to the effect that the resin of the root of *Podophyllum peltatum* is soluble in boiling water, are of considerable importance to us American pharmacists. Inasmuch as the bulk of podophyllin consumed in the world is probably manufactured in the United States, a conflict with European consumers, in regard to the qualities of the article might seriously disturb the market. Wholesale dealers could insist on the identity reactions of the U. S. P. in their purchases.

I venture to hope that the following contribution will be accepted in that spirit of tolerance with which Mr. Beringer's critique ought to be greeted. It has seemed to me important that a statement of parallel experiences respecting the solubility of Resin Podophyllum appear on record in the same journal. Year after year, a wealth of information is treasured up in our records, upon which the profession has a perfect right to draw. The following data are offered here, since they do not appear in print in the form of a separate publication.

The tabulated report below represents the actual status. The five samples were original samples and none were over two years old.

I am perfectly aware that a dilemma confronts me here: Does a Podophyllin answering to the requirements of the U. S. P. contain more of the active portions than the product at present in the market? This query immediately gives rise to another: Is it possible

to manufacture a product according to the Pharmacopœial tests? Is the regular *modus operandi* correct, as described by Mr. Beringer on p. 12, of the January number of the "American Journal of Pharmacy," for the determination of the matter soluble in boiling water? Or, must we abide by Prof. Power's process? Personally, I have boiled one gram of the resin, with about 100 cc. water for five minutes; decanted the fluid through a filter; evaporated the filtrate; during the evaporation boiled the undissolved residue, remaining in the flask, with a fresh quantity of water; decanted closely, filtered through the same filter, and repeated the operation once more, adding the filtrate to the since evaporated quantity, the water remained nearly colorless at the third repetition. The residue of the evaporation was dried to constant weight (100° C.), as is usual in analytical work. Here might have crept in an error of a few milligrams of soluble matter, but this can be overlooked for pharmaceutical purposes. The influence on the percentage was, in my opinion, not very great.

The sample that yielded, under the comparative testing, the highest results to ether and to boiling water (III), has been submitted to a more prolonged boiling process.

One gram of the drug has been boiled five times with 50 cc. of water; the fluid obtained was decanted and filtered through the same filter, and the residue, 6 cc., dried to constant weight at 100° C.

Results: thirty-two per cent.—far different from eighty per cent.

The pharmacographical information at my command respecting the roots used is meagre and does not contribute anything to our knowledge. The collection is left to herb-gatherers, and the roots are manufactured for Podophyllin as obtained from them.

The tabulated report below needs no further comment:

Samples.	Solubility in Absolute Ether.	Solubility in Boiling Water.	Solubility in Alcohol, 90 per cent.	Solution in KOH and Acids.	Color of Samples.	Reaction of Fe_2Cl_6 in Watery Solution	Moisture.
	Per Cent.	Per Cent.					Per Cent.
I	81·4	26·4	The Pharmacopœia requiring in all proportions, any deviating experience would give rise to a fruitless controversy.	Pharmacopœia prescribes no proportions.	Differed largely from Pharmacopœia, varying from dk. gr. to yellow green.	Agreed with U. S. P., but this does not prove much.	—
II	80·4	24·8					—
III	88·8	28·1					3·6
IV	77·8	26·0					—
V	± 80.0	23·7					—

*I have only a small sample and want to preserve this, the color being entirely different from that of previous samples. U. S. P. requirements, 15-20 per cent.

THE TANNIN OF PUNICA GRANATUM.

By John Culley, Ph.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy, No. 135.

Considerable difficulty was experienced in obtaining a good quality of the drug, which appears to be but little used in this section. Before taking up the study of the special constituent, it was thought desirable to subject the bark to the action of solvents, that a knowledge of the proximate composition of the sample under examination might be gained thereby.

The following are the summarized results of the analysis:

	Per Cent.
Benzol Extract, Fat, fixed oil, wax and caoutchouc,	·76
Stronger Ether Extract, Crystalline resin and chlorophyll,	·30
Absolute Alcohol Extract, Tannin, gallic acid, alkaloids and glucose,	9·93
Distilled Water Extract, Glucose, mucilage, dextrin and extractive,	12·35
Alkaline (0·2 per cent. Sodium Hydrate), Water Extract, Pectin, albumenoids and extractive,	6·26
Acidulated (0·2 per cent. Hydrochloric Acid) Water Extract, Pararabin, calcium oxalate and undetermined,	7·62
Chlorine Water, Lignin,	8·93
Cellulose,	31·89
Moisture,	8·70
Ash,	10·56
Loss,	2.70
Total,	100·00

EXTRACTION AND PURIFICATION OF THE TANNIN.

Acting on the advice of Professor Henry Trimble, acetone was selected as the solvent for extracting the tannin.

The ground bark was percolated with acetone, the solvent recovered, the extract treated with water and the resinous principles filtered off. The filtrate was shaken with several successive portions of ether, which were separated from the aqueous layer, mixed, and spontaneously evaporated.

The residue, left after the dissipation of the solvent, was treated

with water, the solution filtered and again shaken with ether, which removed, and left upon evaporation, crystals which gave the following reactions for gallic acid:

Ferric chloride, dark-blue color.
Sodium carbonate, green color.
Sulphuric acid, purple red color.

The aqueous layer, from which the gallic acid had been removed by ether, was agitated with acetic ether. The several quantities of this liquid so applied, were mixed, and distilled, under reduced pressure, to dryness. The residue was treated with a mixture of two volumes of alcohol and one volume of ether, the insoluble part was separated by filtration and the filtrate distilled to dryness under diminished pressure.

By repeating this process several times, a porous, red-brown tannin was finally obtained. This was further purified by solution in water, and filtration through its lead compound obtained by precipitation of part of the solution with lead acetate.

From the much lighter colored filtrate acetic ether removed a purer tannin.

The aqueous layer, from which the gallic acid and some tannin had been removed by ether and acetic ether respectively, was now completely precipitated with basic lead acetate. The mixture was filtered. The precipitate produced by the lead salt was suspended in water and decomposed by hydrogen sulphide. Lead sulphide was separated by filtration and the filtrate warmed to expel the excess of the gas, after which it was cooled, saturated with sodium chloride and agitated with successive portions of acetic ether. This solvent removed the tannin, and, upon being recovered under reduced pressure, left the same in a purer condition than when obtained by the preceding methods.

All the tannins were further purified by solution in a mixture of three parts by volume of ether and one part by volume of alcohol, filtering and distilling under reduced pressure, whereby they were changed into a more or less porous form.

All of these tannins were found to be the same, as shown by the following reactions of their one per cent. solutions, from which gallic acid had previously been removed by agitation with ether.

For comparison, the reactions of gallotannic acid are placed alongside of those obtained.

Reagent.	Tannin of P. Granatum.	Gallotannic Acid.
Ferric chloride, and Ammon. carbonate,	Blue-black ppt. / Purple ppt.	Blue-black ppt. / Purple ppt.
Tartar emetic, and Ammon. chloride,	Faint cloudiness. / Pale ppt.	Faint cloudiness. / Pale ppt.
Potassium bichromate,	Brown ppt.	Brown ppt.
Calcium hydrate,	Light-colored ppt., turning blue.	Light-colored ppt., turning blue.
Bromine water,	No ppt.	No ppt.
Ferric acetate,	Blue-black ppt.	Blue-black ppt.

The tannins were submitted to ultimate analysis with the following results:

	I.	II.	III.
Carbon,	50·60	50·52	50·34
Hydrogen,	3·88	4·13	3·98
Oxygen,	45·52	45·35	45·68
	100·00	100·00	100·00

	Average of three combustions.	Gallotannic acid $C_{14}H_{10}O_9$.
Carbon,	50·48	52·10
Hydrogen,	3·99	3·52
Oxygen,	45·53	44·38
	100·00	100·00

In view of the fact that the qualitative reactions of this tannin agree with those of gallotannic acid, and that the ultimate composition compares quite closely for a substance so difficult to purify, on account of its amorphous condition, we are forced to conclude that the tannin of *Punica Granatum*, is identical with that of galls.

ECONOMIC BOTANY.

By Edson S. Bastin, A.M.

Economic Botany may be briefly defined as botany applied to useful ends, or as the study of plants in relation to the wants of mankind. That plants do stand in very close relation to human happiness and welfare, and even to the necessities of man's existence, is a fact so obvious that it scarcely needs to be dwelt upon. We depend upon the vegetable world for the greater share of our food, and, if we take into account the fact that the animals we employ for food, all either directly or indirectly obtain sustenance

from plants, we may say that we are absolutely dependent upon them for the essentials of our diet, and would quickly perish without them.

We depend scarcely less upon them for our clothing and building materials, and for numberless other things upon which our comfort and well-being depend.

We also draw from the vegetable world the greater part of the medicines we employ in healing our diseases. There are also the best of reasons for believing that if it were not for the chemical activity of plants in breaking up the carbon dioxide so constantly exhaled into the atmosphere from the lungs of animals, from the chimney throats of our factories and private dwellings, and from the processes of decay that go on about us everywhere—if it were not for this and the restoration of pure oxygen to the atmosphere that the chlorophyll plants are all the time accomplishing, the atmosphere itself would soon become so vitiated that it could no longer sustain the higher forms of animal life, and we should perish from the earth.

In still another respect, we are dependent on this world of plants. If it were not for the bacteria and fungi, those despised and very much dreaded parasitic and saprophytic organisms whose work is largely that of tearing down and restoring to the mineral kingdom, and so to available forms for growth, dead organic bodies, the earth would soon be piled so high with corpses that there would be neither room nor sustenance for living beings.

It is largely on account of these relations between plants and human welfare that botany, the science of plants, has grown up. True, superstition has had something to do with its beginnings, as it has with those of other sciences, chemistry and astronomy, for example. The superstitious belief in a philosopher's stone stimulated the research which gathered together many important facts that have greatly helped to lay the foundation of chemical science. Likewise, it was a superstition that the stars sway the destinies of men, but it stimulated observation of the heavenly bodies and aided to accumulate the facts on which rests the superstructure of modern astronomy. So, in botany, for example, the absurd doctrine of signatures, which so long prevailed in medicine, led to a decided extension of our knowledge of plants, and so helped build a science of botany.

We have many things to blame superstition for; as a general thing the world has no use for it, but it is well to recognize the fact that it has not always been wholly evil in its effects.

But the foremost cause of the development of botany, in its earlier years at least, was *utility*.

Some knowledge of plants was so much one of man's necessities —to know what plants were useful and what ones dangerous—that long before he reached the stage of mental development when science in any proper sense was possible, a considerable body of facts were gotten together to build upon when the proper time should come. Thus, as we are well aware, the use and cultivation for food, medicine or textile materials of many of the plants we value most, extends far back of the period when written human history began. This is the case with wheat, maize, barley, millet, sorghum, the opium poppy, cotton, the banana, apricot, orange, melon, pumpkin, bean, pea, manioc, olive, rice, peach, sweet potato and flax.

In many of these instances, in fact, as with maize, we are absolutely ignorant of the wild plant from which the cultivated form is derived. In some cases, most likely, the changes brought about by the ages on ages of cultivation are so great that we are now unable to identify the cultivated with the wild parental form; it has, in fact, been developed into a distinct species. This, perhaps, is the case with wheat. In other instances, probably the parental form has perished altogether, as DeCandolle believed to be the case with maize.

In one sense, then, botany *began* as economic botany, began with the utilities in far-off times, and since then until comparatively recent times has chiefly occupied itself with them. But when man reached the age of reason, and science in the proper sense of the term became a possibility, plants came to be studied, not solely or chiefly with reference to their uses, but from a desire to understand what they were in themselves, what were their relations to each other, to the mineral world on the one hand and to the other half of the organic world on the other. The passion to know plants took possession of some men as that to know the mechanism of the heavens or the structure and development of the earth possessed others, and so scientific botany became a reality.

This new development of botany may be said to have begun

about three centuries ago, with the work of the Florentine, Cæsalpinus, but it made only slow progress until about a century later, when the Englishman, John Ray, in his *Methodus Plantarum*, laid the first really rational basis for plant classification. From this time on, through the work of Tournefort, Linnæus, Jussieu, A. P. De Candolle, Endlicher, Lindley, Hooker, Bentham, Alphonse De Candolle and Gray, systematic botany has made rapid and splendid progress.

Necessarily, owing to the later development of the compound microscope and that of chemical science, the growth of physiological botany was more retarded. Although in ancient times some crude notions existed about the sexuality of plants, the functions of stamens and pistils do not appear to have been understood until Grew explained them in 1676. From this time until 1823 no great progress was made in this branch. In this year, Amici discovered the pollen tubes, and a little later Robert Brown traced them to the nucellus of the ovule. Since then the embryology of plants has made rapid strides through the labors of such men as Schleiden, Mohl, Naudin, Hofmeister, Strasburger, Baillon, Bornet, Decaisne, Tulasne, and last, but not least, Darwin.

The latter's work on cross-fertilization not only opened up a wholly new field in connection with the subject of sexual physiology, but his works on climbing plants and on insectiverous plants, as well as his earlier work, in which he promulgated his doctrine of the origin of species by natural selection, have given a tremendous impulse to other branches of vegetable physiology.

It is true that this development of which we have just been speaking has mainly been on the purely scientific, rather than on the utilitarian side, at least until quite recently. But a science pursued for its own sake, with a pure love of knowledge for its motive, and regardless of ulterior results, could not but lead to important practical applications, and so it has been in this instance. Especially have the developments in vegetable physiology found abundant applications. There is no branch of economic botany that has not received tremendous impetus from the researches of such men as Sachs, Strasburger and Darwin.

The researches of these men seem far enough from what is ordinarily called practical, nevertheless they have served as a leaven, to leaven the whole lump of botany, practical as well as theoretical;

and economic botany, which for a thousand years had stood still, now shows everywhere signs of the most stirring activity. Not only are the old departments of the subject revivified, but new ones have sprung into life. Agricultural experiment stations, in many cases most elaborately equipped for the investigation of all that relates to useful plants, have been established in every country in Europe, and in nearly every State in the Union; courses in forestry have been established in some of the European, and I believe in at least one of our American Universities; and various professional schools, particularly medical schools and schools of pharmacy, have felt the new impulse, and established laboratories where medicinal plants are investigated structurally, chemically and with reference to their physiological action.

Let us glance now at the departments of Economic Botany. These may be stated to be as follows: (1) Agricultural Botany. (2) Horticultural Botany, with its sub-departments of Pomology, Arboriculture and Floriculture. (3) Forestry; and (4) Medical or Pharmaceutical Botany.

This classification is in some respects one of convenience and custom rather than a strictly scientific one. It would be hard, for example, to draw a sharp line of demarkation between Agricultural and Horticultural botany.

Agricultural botany, using the term in its commonly accepted sense, includes all knowledge relating to the plants which are cultivated on the farm in distinction from those cultivated in gardens or orchards, and from those growing wild in field or forest. It includes the botany of the cereals, the fodder plants, the edible roots and tubers, various textile plants and others whose products are widely used or cultivated on an extensive scale.

Under Horticultural Botany is usually included the botany of those plants which are cultivated in gardens and orchards, whether for food or other utilitarian purposes or merely for decorative uses, as in the cultivation of ornamental trees, shrubs and flowers.

Pomology, more properly called Fructiculture, is that department of it which relates to the culture of fruits; Arboriculture, that branch which relates to the culture of ornamental trees, and Floriculture, the branch which relates to the culture of flowers.

Horticulture is really a branch of agriculture, though custom and, to a certain extent, convenience, maintain a distinction between

them. Both are governed by the same general principles. In horticulture, however, the plant is more often subjected to artificial conditions, for example, to stove heat, root-pruning, budding, grafting, layering, forcing, and so on.

The proper study of both includes in its scope the commercial history, systematic relationships, life histories, structure, physiology and pathology of the plants cultivated.

Of these physiology takes the leading rank both in its importance and in its scope. It includes not only the study of plant foods and the modes of their assimilation, respiration, metabolism, reproduction, and the influence of various external agents and conditions, as light, heat, soil, drainage, etc., on plants in general, but the study of all these in reference to each particular variety or species under cultivation, and as subject to more or less artificial conditions. The kinds of soil and drainage best suited to the plant, the best manures to employ, the proper order of cropping to prevent exhaustion of the soil, these are things also which are not to be neglected. Of scarcely less importance is a knowledge of the facts and conditions of plant variation, the laws and methods of hybridization, and the modes of taking advantage of these for the improvement of plants in any desired direction. Nothing, in fact, that has happened recently has so stimulated the agricultural arts or encouraged so much hope for future progress in them, as the revelations of the last twenty-five years in vegetable physiology.

The pathology of cultivated plants, that is the nature of the bacterial and fungous diseases to which they are liable, and that of the insect pests that attack them, together with the knowledge we are acquiring slowly but surely of the best methods of dealing with these enemies, is of scarcely less practical importance. It is a subject also which at the present time is engaging the talents of many of our best botanical investigators.

Forestry is a comparatively new, though none the less thriving and important branch of economic botany. Besides including a knowledge of the structure, botanical relationships, physiology and pathology of trees, it deals with such subjects as the best modes of planting, caring for and preserving forest growths, of re-foresting denuded areas, of estimating by means of accurate tests the relative values of different timbers for constructive and other purposes, the rate of forest growth, the age attained by different species of trees,

the relations of timbered areas to rainfall, to drainage, to the health of the population and to the permanence of the configuration of the earth's surface, the methods of preventing the encroachment of sand dunes upon fertile areas, and the introduction and acclimatization of new species of trees.

In many of the older countries of Europe schools of forestry have been established and systematic measures are employed for the care and preservation of the forests. In Germany and France forestry has become a profession, which gives employment to a considerable number of intelligent men. In this country we have permitted the destruction of a very large share of our forest wealth—a wealth greater probably than that of any other nation in the world—and we are only now awaking to a sense of the loss and beginning to take measures to prevent further destruction.

Although the means thus far adopted are quite inadequate, they form an entering wedge to further action, and the splendid work that has been done by Sargent and Fernald has so awakened intelligent public sentiment that we may hope for satisfactory legislation on the subject in the near future.

Pharmaceutical or medical botany, the branch which most directly concerns us, is in some respects behind the other departments in its development; in others, however, it is fully abreast of them. Although general botany owes more to this branch than to any other, since the earlier botanists were mostly either physicians or pharmacists and since the earliest botanical gardens were established chiefly for the cultivation of medicinal plants, medical botany is behind the age in the cultivation and improvement of the plants with which it deals. There are still a very large number of important medicinal plants that are either not cultivated at all, or are cultivated to such a limited extent that we are still dependent for our supplies of them on the primitive forests and prairies. Our agricultural colleges and experiment stations leave the medicinal plants almost wholly out of account, and excepting the case of the Cinchonas and a very few other drugs, experiments with them are left entirely to individual enterprise.

It is behind the agricultural branches also, in the fact that inadequate attention has been given to the study of the structure of the plants with which it deals. True, there are signs of awakening in this direction and a hope for better things in the near future.

As respects the physiology of medicinal plants and particularly that important branch of it which relates to the increase and improvement of the yield of medicinal constituents, nothing more encouraging may be said than that it is sadly neglected, the schools, even those of pharmacy, having ignored the subject altogether.

In two or three lines only does this department appear to have kept abreast of agricultural and horticultural botany. This is, perhaps, the case with vegetable histology, and it is decidedly the fact with the investigation of the chemical constituents of plants. Since the German apothecary, Sertürner, in 1817, announced the discovery and isolation of the first known alkaloid, morphine, there has been in our profession increasing activity in this line of research, and never has there been such widespread interest in the subject as at present. To the credit of this college it should be said that it has done its full share of work of this character.

But what has been done—valuable as it is—is only an infinitesimal part of what remains to do. That may not be wholly true which Emerson suggests, that every weed is a plant, the uses of which we do not yet understand, but it is safe enough to say that amongst the 175,000 or thereabouts of plant species that have been described and named, and the possibly as many more that await discovery, there are many times the number we know of at present that are capable of serving mankind in a useful way. We know not what value may lie even in many of the despised weeds about us, to be revealed by careful chemical research. Every day we are discovering new vegetable principles and discovering new uses for old ones. If such wealth as the aniline dyes came from such an unpromising and apparently worthless substance as coal tar, what may we not hope from the many thousands of plants that are scarcely known to us yet, except by name? Of the flowering plants that remain to be discovered we cannot count on more than from 10,000 to 12,000 species, but these give great promise, because they lie mostly in the great central regions of Africa and Asia, where plants of much potency may be expected to occur.

The least explored botanical fields are those of fungi and bacteria. How many species of these groups remain to be described it is impossible even to guess. We can only say that the number is vast, and possibly when all are known may be found to exceed that of all other plants put together. The probabilities of

obtaining many important remedial agents from each of these groups are most encouraging to investigators. Many of the fungi are proven to be palatable, highly nutritious and easily cultivated food plants, and it is largely suspicion and ignorance that prevents us from making more common use of them. The many poisonous species have made the whole group suspected, but this fact should encourage rather than retard pharmaceutical research, for dangerous poisons have often proven useful remedies.

As for bacteriology, so closely and directly is its study related to human welfare, and so important are its achievements in recent years that it is well entitled to rank as a separate branch of economic botany. Its achievements in the score of years of its existence have been vast, but we may hope for much greater results in the future.

According to Sturtevant there are 1,192 species of plants that have at one time or other been cultivated for food, and the whole number which are known to have been used as food, including those resorted to in time of famine, is 4,090 species, but even the smaller of these includes many plants of little value. I find even in Smith's Dictionary of Economic Plants only 515 food plants mentioned, and this certainly would include all of the important kinds. Even of these I judge at least two-thirds have either a very doubtful value or only a local or very limited use. The great food staples of the world are really few in number, but there seems no good reason why they should not be increased many fold, not merely by discovery of new kinds, but by the improvement of old ones. If it is true, as some botanists believe, that wheat in its numerous varieties, now constituting probably the most important food of the human race, was originally derived from Ægilops ovata, a grass of little consequence in its wild state even as a forage plant, what possibilities are presented by numerous other grasses, if only they could be subjected to intelligent cutivation?

A man walking along the coast of England or France may to-day find a tall, straight-stemmed, glaucous-leaved crucifer, which bears at its apex a compact raceme of yellow flowers. Its leaves are lobed and somewhat wavy or crispate, and the stem, when stripped of them and dried, would make a fair walking-stick. The plant is the wild *Brassica oleraceæ*, from which have been developed the common white cabbage, red cabbage, Savoys, coleworts, the borecole or Scotch kale, curly greens, cauliflower, broccoli, kohl-

rabi, the cow or Jersey cabbage, and as some believe, the common turnip, forms in appearance and habit often so different from each other, that no one not a botanist would suspect their common origin. Precisely how they originated we don't know; but they are the result of a long course of cultivation. Are there no other of our Cruciferæ that possess similar possibilities?

A few years ago there were enumerated in the transactions of one of the horticultural societies of Great Britain, 1,500 different varieties of the apple, and this probably does not include nearly all that have been produced from the original wild apple of Europe and Asia. Many other species of Pyrus that have never been subjected to experiment, possess, for aught we know, as much promise as Pyrus Malus.

The Japanese have made out of their persimmon what they regard as their most valuable cultivated fruit, but the wild plant, I am told, yields a fruit no more desirable than those of our two wild species. In fact, our common persimmon shows a great tendency to variation, even in the wild state, thus making it a most promising subject for experiment. Scarcely less urgently do the Butternut, Black Walnut, Hickories, Hazels, Blueberries, Serviceberry, some of the Shepherdias, the species of Physalis, Apios tuberosa, Psoralia esculenta and many other native species, invite us to experiment.

Of course, experiments of this kind must be made by government and in long lines of policy, as important results in the case of long-lived plants at least could not be expected in a single generation of men. It is not necessary to suppose, however, that because it has taken thousands of years to bring about the present excellence of many of our food plants, it would take the same length of time to similarly improve our wild ones. What was accomplished unintelligently in long ages might probably be done in a few generations by taking advantage of the now known laws of variation, hybridizing and artificial selection.

Coming again to medicinal plants, I find that the last edition of the U. S. Dispensatory enumerates over 1,300 that are more or less employed in medicine, and a fair estimate of the whole number in use, I think, would be not far from 3,000. This, of course, would not include all that have been employed in medicine; it would be impossible, even approximately, to estimate these; but only those plants that are at the present time more or less habitually employed

by man, either civilized or savage. Of these, probably the great majority are worthless or nearly so for the purposes for which they are employed. Even of those mentioned in the Dispensatory, only 244 are regarded as of sufficient value to be given a place in the Pharmacopœia of 1890, and some of these, I am sure, are retained, not because of their intrinsic worth, so much as because they are extensively used.

But taking the pharmacopœial plants as representing fairly well those at present approved by the intelligence of mankind, how small a proportion must it be of those that will ultimately be proved valuable! How small a portion of the earth's flora has been investigated even superficially, with reference either to medicinal constituents or physiological action! Even among the drugs that have been studied to some extent with reference to these points, in how few cases has the work been done in an exhaustive or thorough way! The greater the amount of study given to the chemical principles of plants, the more we realize how endless is the variety and how great the probabilities are that vast numbers of undiscovered ones yet exist that may prove of inestimable value to mankind.

In the line of cultivation of medicinal plants, with the view to their improvement, just enough has been done to prove the importance of further work in the same direction. Owing to the imminent danger that the destructive methods of gathering Cinchona barks in South America would soon lead to the extermination of these trees, the necessity for cultivating them arose a few decades ago, and experiments were begun in India and elsewhere on a large scale, and with most interesting and suggestive results. It has been found that by careful selection of favorable species, by crossing and again selecting favorable variations, barks may be produced which yield double or even treble the quantity of alkaloids produced by the best varieties from wild trees in their native Andes. Therefore, by precisely the methods employed by the floriculturist and pomologist, the drug gardener may improve the medicinal plants he cultivates.

Only one other line of development will I occupy a moment in directing attention to, and that is, the possibilities that lie in the micro-chemical study of drugs. The methods of macro-chemical investigation are under such headway that creditable work is being done by them in chemical laboratories the world over; but only quite recently have micro-chemical methods risen to prominence. It

is now possible, by means of the microscope, to recognize with certainty the presence of a large number of important medicinal constituents, including many of the alkaloids and glucosides. In many cases, to one skilled in the use of the microscope, it constitutes the simplest and speediest mode of analyzing a drug qualitatively. Among the glucosides that are recognizable by this means are coniferin, datiscin, frangulin, hesperidin, phloridzin, rutin, salicin and saponin; and among the alkaloids, aconitine, atropine, berberine, brucine, colchicine, corydaline, cytisine, morphine, narcotine, narceine, piperine, strychnine, theobromine, caffeine, veratrine and nicotine.

The microscope, in the hands of the intelligent pharmacist, is thus destined to become a much more important instrument than heretofore in identifying drugs, judging of their quality and detecting adulterations.

OAK WOOD AND BARK.

By Wm. B. Thompson.

It is asserted that oak timber of the present, particularly in England, is not the equal in durability to that of a former period. If the wood has deteriorated is it not likely that the bark, too, has become inferior? Tanning barks, especially of the oaks, play an important role in the arts. An exhaustive examination of the various derivatives of the universal astringent principle of vegetable substance—tannin—in its natural combinations, shows great variation in the respective yield, which variation is influenced by climate, soil, culture, season-periods and other causes. As these agencies change or become modified by further circumstances, the time will, no doubt, arrive when some natural productions of the vegetable kingdom may be so diminished in amount and quality of product as to cause serious inconvenience. One chief source of error in the cultivation of trees and plants exists in the fact that we do not adhere with sufficient exactness to the processes which Nature in her laws has wisely established for the fulfilment of her designs. The agriculturist, in the cultivation of his arborous and other trees, aims to produce, with growth, points of beauty. Nature does this too, but unlike the man, she never sacrifices the utilities to the pleasing attributes. The germination of seed, and the means by which healthful, progressive growth is secured, is a subject which may and can be

better comprehended. The acorn falls upon the *surface* of the ground, and the natural processes take care of it there. Man buries the seed of the oak, and the probabilities are that he blunders in doing so. An examination of a sprouting nut will show that this growth tends downward, as if in an effort to reach the soil, whilst the acorn lies on its side, though even then the little tubercule which is ultimately to become the tree, keeps its apex upward. This makes it evident that this part of the process, at least, should be performed in the air and light, that is when it is done as Nature intended. It is usually considered that during the fermentative part of the process of germination—the earliest stage—light should be excluded. This cannot apply, however, to the seed of the oak, because that part of the process is performed before the shell is ruptured. Now, the conditions which surround the starting point of vegetable growth are good subjects to study, and are also matters which cannot be treated with indifference, or in ignorance, if we propose to attain good results. Just what bearing the air-grown and the earth-grown processes have, relatively, upon the fibre and the heart of oak, it would be of much interest and value to know. A buried acorn somehow strives to get to the surface, and when there, this is noticed—that the cotyledons acquire a greenish tinge of color which they do not have when buried. Does this not furnish some significant information? Is it not known that in all etiolate plants, when compared with the same species which have been air-grown as it were, or grown in the sunbeams, are wanting in *carbon* and *astringency*—the very essentials in which the now perishable wood of oak is so markedly deficient. Is not our blanched celery of the table an illustration of this also? We have soft, tender threads and much succulency. So in the artificially grown oak we have a loose texture and a weak fibre. Think for a moment of the wood of oak enduring in use five hundred years! Start growth wisely and well, the timber, and parts will be good; the tree may be gnarled, stunted, deformed in comparison with lines of grace, symmetry and beauty in limb and branch, but the durability will nevertheless be there, and the traditions of the staunch old oak still be a boast of our time.

THE PRESENCE OF LEAD IN TARTRATES.

By F. W. Haussmann.

At a former meeting, while discussing the subject of lead in citrates, the suggestion was made that similar results to those stated could perhaps be obtained by an investigation of commercial tartrates.

Acting upon this suggestion, the writer made a number of examinations analogous to those described in the treatise upon lead in citrates.

TARTARIC ACID.

Tartaric acid, as occurring in commerce, is seldom in the original crystalline state, the powdered article being almost exclusively found in the shops.

Due to this, the presence of particles of metallic lead is less frequently noticed than in the case of citric acid, although tartaric acid, being crystallized in lead-lined tanks, is also liable to the same impurity.

The Pharmacopœia likewise calls attention to this fact, giving the necessary tests for the detection of metallic impurities in the commercial acid.

To determine whether the tartaric acid of commerce also contained metallic lead, rather large amounts, obtained from different sources, were dissolved in water and allowed to stand.

A few metallic particles were found deposited in most cases, which, upon treatment with nitric acid and subsequent application of reagents for lead, indicated the nature of the deposits.

The solutions, when examined, also frequently gave indications of traces of the metal in soluble form.

Trials were also made, as in the case of citric acid, to ascertain the extent of the action of tartaric acid upon the metal.

Some lead particles were left in contact with an aqueous solution of the acid for 12 hours.

The filtered solution, examined according to the pharmacopœial directions, prominently revealed the metal to have passed into solution.

COMMERCIAL TARTRATES.

As a rule, the tartrates of commerce appear to possess a greater degree of purity than the citrates.

This statement is based on the fact that in the writer's experience the reactions obtained for lead in tartrates were considerably less prominent than in the case of citrates.

Those of greatest importance to the pharmacist and most demanded by the public are potassium bitartrate or cream of tartar, potassium and sodium tartrate or Rochelle salt, and the neutral tartrate of potassium.

POTASSIUM BITARTRATE.

The cream of tartar of commerce does not appear to be perfectly free from metallic impurities, which is probably due to its method of preparation.

Several samples, on being subjected to the pharmacopœial tests, revealed the presence of traces of lead.

This is, however, not to the same extent as found in the case of commercial citrates.

Other samples again, when subjected to an examination, gave perfectly negative results as to any metallic presence.

ROCHELLE SALT.

Some ten samples of this salt were subjected to the various tests for lead, none of which gave any indication whatever of its presence.

The Rochelle salt of commerce appears to possess a high degree of purity, in the crystalline as well as the powdered state.

In connection with this it may be stated that the contents of a number of Seidlitz powders were also examined.

While the contents of the white acid papers occasionally showed small particles of metallic lead, in a few cases also giving indication of its presence in solution, those of the blue Rochelle salt papers were found to be free from the same.

A similar statement can also be made regarding the Seidlitz mixture of commerce, which, while occasionally varying in composition, is free from any metallic presence.

To determine whether tartrates exerted any action upon metallic lead, a number of particles of the metal were allowed to remain in contact with a 25 per cent. solution of Rochelle salt. This solution was found to be perfectly neutral as well as free from lead.

After a contact of six hours, the solution was examined and

revealed an abundance of lead in a soluble form upon the addition of ammonium sulphide solution.

On prolonged contact, as the lead passes into solution, the mixture becomes alkaline, changing the color of red litmus as well as turning red with phenolphtalein test solution. This would indicate the liberation of an alkali hydrate.

The same observation was also made with the citrates of lithium and potassium.

POTASSIUM TARTRATE.

This salt is rarely employed in medicine, not being official.

In the Pharmacopœia of 1880 it was used in the preparation of Fehling's solution.

Of the commercial tartrates examined, this salt was the only one which showed the presence of an appreciable amount of lead in a soluble form. Particles of metallic lead were not found. The three samples examined gave decided reactions for lead.

LEAD TARTRATE.

If the conjecture is correct, that in the latter salt the lead exists in the form of tartrate, it may be of interest to inquire into the character of this compound.

Trials to determine its nature were made similar to those described in connection with citrate of lead.

Several forms of lead tartrate exist according to Watts' Dictionary of Chemistry.

To determine the solubility of this salt it was first attempted to prepare the same by saturating a concentrated aqueous solution of tartaric acid with lead carbonate, keeping the mixture at the boiling point during saturation.

The mixture was allowed to stand some time before it was examined.

The tartaric filtrate, separated from the precipitated salt, unlike in the case of citric acid, gave but slight indication of the presence of lead, not the heavy precipitates as found in the case of the citrate.

This would indicate that tartrate of lead is but slightly soluble in water, considerably less so than the corresponding citrate.

This is confirmed by an examination of the precipitated salt.

PRECIPITATED SALT.

According to the above-cited authority the monoplumbic salt, prepared by the precipitation of a soluble lead salt by means of tar-

taric acid is white, crystalline, soluble in nitric acid and an excess of tartaric acid, also in a solution of ammonium tartrate, in which it solidifies to a gelatinous mass on concentration.

The salt was prepared by the writer by precipitating both lead nitrate and acetate with potassium tartrate.

Thus prepared, the salt is almost completely insoluble in water, in which it differs, as already stated, from the citrate.

It is readily soluble in dilute nitric acid, less so in acetic acid, but dissolves to some extent in a concentrated solution of any soluble tartrate.

The degree of concentration apparently influences the solubility to an extent.

If such a solution is allowed to stand, the lead salt is slowly reprecipitated.

This also takes place if the concentrated solution is diluted with water.

The fact that insoluble tartrates dissolve in the presence of alkali tartrates is illustrated in the case of cream of tartar, which contains calcium tartrate, and is doubtless present due to this cause.

Singularly, lead tartrate is readily soluble in a solution of potassium citrate, from which, however, it soon reprecipitates on standing, as in the case of citrate of lead.

To summarize, the following statements may be made regarding commercial tartrates:

Tartrates prepared directly from the acid are more liable to the presence of lead than when prepared from cream of tartar or similar sources.

This has been the writer's experience, while preparing a series of alkali tartrates for comparison with the commercial salts, and for determining the solubility of the lead salt.

Cream of tartar apparently possesses a greater degree of purity as regards the presence of metals than tartaric acid.

Finally, the citrates appear to be more liable to contain lead than the tartrates.

This is readily explained, as the former are usually prepared directly from the acid, while in the case of tartrates, cream of tartar appears to be the source from which they are prepared on the commercial scale.

FOUR OAK BARKS FROM INDIA.

By Henry Trimble.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 136.

Some months ago, through the kindness of David Hooper, there were received from A. E. Wild, in the British service at Dehra Dún, India, the following oak barks:

Quercus annulata (Inai).
" *incana* (Ban).
" *dilatata* (Moru).
" *semicarpifolia* (Karshu).

After reserving samples of each for cabinet specimens, the amount of material for investigation was necessarily small.

The bark from each of the four species was estimated for tannin by the "hide" method. The moisture was also determined in each case, so that the results of the tannin estimations might be stated on the absolutely dry bark, in order to facilitate comparison.

The results in per cent. were as follows:

Species.	Tannin in air-dry bark.	Moisture.	Tannin in absolutely dry bark.	Ash in absolutely dry bark.
Quercus annulata, ...	11·37	6·85	12·20	11·30
" *dilatata*, ...	7·40	6·88	7·94	10·02
" *incana*, ...	22·12	5·31	23·36	11·06
" *semicarpifolia*, . . .	7·99	7·04	8·60	10·88

In order to separate the tannin from the different barks for the purpose of more closely examining it, they were reduced to powder and exhausted with acetone. The solvent was recovered by distillation.

The residues of these acetone extracts were in all cases very largely soluble in water, with which they were treated for the purpose of separating resin and phlobaphene. After filtration, acetic ether was used to remove the tannin, but only in the case of the the bark from *Q. semicarpifolia* was there a notable residue left upon the evaporation of the solvent.

These residues were treated with water, the solutions filtered and agitated with acetic ether, which again removed the tannin. This process was repeated until the tannin was completely soluble in water.

On account of the small amount of bark and the readiness with which the tannin changed to anhydride, the former could not be obtained from the first three species in a state of purity to warrant ultimate analysis. Attempts to prepare it purer by other methods

involving the use of lead acetate, and of sodium chloride and acetic ether, afforded no better success.

The tannin of *Q. semicarpifolia* was dissolved in a mixture of ether and alcohol, the solution filtered and distilled to dryness under reduced pressure, by which means the substance was rendered quite porous. After treating the thoroughly dried tannin with absolute ether to remove resin and crystalline substances, it was again made porous by dissolving in ether and alcohol, and recovering the solvents under diminished pressure. The tannin so obtained had a light reddish-yellow color and was completely and readily soluble in water.

One per cent. solutions of the tannin from the different species reacted as follows:

REAGENT.	*Quercus annulata.*	*Quercus dilatata.*	*Quercus incana.*	*Quercus semicarpifolia.*
Boiled with dilute sulphuric acid, ...	red phlobaphene.	red phlobaphene	red phlobaphene	red phlobaphene
Ferric acetate, ...	brownish-green ppt.	brownish-green ppt.	green ppt. and color	green ppt. and color
Bromine water, ...	yellow ppt. turning brown	yellow ppt. turning brown	yellow ppt. turning brown and black	yellow ppt.
Ferric chloride and Ammon. hydrate } . . .	dark green ppt. dark purple ppt.	brownish-green ppt. dark purplish-brown ppt.	brownish-green ppt. brown ppt.	green color and ppt. purplish-brown ppt.
Ammonio-ferric sulphate, ...	dark green ppt., brownish color	brownish-green ppt. and color	bluish-green color, green ppt.	green color and ppt.
Lime water, ...	brownish-yellow ppt., darkening	brownish-yellow ppt., becoming purple	brownish-yellow ppt. darkening	yellowish ppt. turning pink
Nitrous acid, ...	brown ppt.,	brown ppt.,	brownish-black ppt.	brownish-yellow ppt.
Sodium sulphite, ...	reddish-brown ppt.	purplish-brown ppt.	brownish-purple ppt.	yellow color
Stannous chloride and hydrochloric acid, . .	slight reddening of color	slight reddening of color.	slight reddening of color	pink color
Pine wood and hydrochloric acid, ...	violet color	violet color	violet color	violet color
Potassium bichromate,	heavy brown ppt.	heavy brown ppt.	heavy brown ppt.	heavy brown ppt.

The tests in general became darker on account of the coloring matter associated with the tannin.

The following results were obtained by submitting the tannin of *Quercus semicarpifolia* to combustion:

	Per cent.
Carbon,	60·15
Hydrogen,	5·19
Oxygen,	34·66

The similarity in behavior toward reagents indicated the tannin from these four barks to be identical with one another, and with that from several species of oaks indigenous to this country, recently investigated by the author. The ultimate analysis of the tannin from one of the above samples confirms the opinion that in them we have a tannin identical with that from our own species.

Two of the samples exceed in tanning capacity the bark from any of the American oaks, while the other two are equal to the average of our own.

MEMOIR OF WILLIAM B. WEBB.

William Barber Webb, for many years a member of the Board of Trustees of the Philadelphia College of Pharmacy, deceased suddenly at his home in this city, on the tenth day of February, 1894, in the 70th year of his age.

He was born in York, Pa., September 6, 1824. The first fifteen years of his life were passed in his native city, amid the comforts and happy associations of the domestic circle.

His father, James Barber Webb, was a man of intelligence, interested in literature and science; he made a companion of his son, and directed him in his selection of reading, and William thus, at an early age, acquired a knowledge of the writings of many standard authors. This early training was of great service to the improvement of his mind, as he had subsequently but few advantages in schooling.

When William was fifteen years of age, his father died, and the widowed mother and three children found themselves deprived, by the dishonorable acts of others, of the property which they should have inherited.

Laying aside his former comforts and habits, the boy commenced a life of self-denial. He gave up school, and sought for some occu-

pation which would afford him a support. Going to Baltimore, he found employment with Coleman & Buchanan (afterwards Coleman & Rodgers), druggists.

Here he remained until an attack of sickness rendered necessary his return home. On regaining his health he was apprenticed to a tinsmith, but, not satisfied with this position, it was soon abandoned.

In 1842, he again left York, with the intention of looking for employment. He went first to Baltimore and obtained a letter of introduction from Mr. Coleman, his former employer, to Charles Ellis of this city.

Arriving in Philadelphia without friends or acquaintances, and with only sufficient money for his support for one week, he called on Chas. Ellis, who informed him that he was not in need of a boy, and recommended him to call on Caleb Needles, at Twelfth and Race Streets, and furnished him with a letter of introduction.

On calling to see Mr. Needles he found, to his disappointment, that he was absent from the city. Edward Needles, father of Caleb, had an interview with him, and was pleased with his manner and earnest desire to find a place which would afford him an opportunity to show what was in him. He advised him to await the return of his son, whom he thought would engage his services.

William felt that he could not afford to spend what little money he had in waiting, and told Edward Neeles his financial situation, and how important it was for him to go to work at once. Listening with interest to his account of himself and becoming interested in the boy, Edward Needles, after consultation with his wife, invited him to stay with them until the return of Caleb, and work in the store, feeling confident that his son, who was in want of an apprentice, would find in William one who would suit him.

It was fortunate for William, in the commencement of his career, to have met with such fatherly kindness as was extended to him by Edward Needles, and the remembrance of this was gratefully cherished by him throughout his life.

On the return of Caleb Needles, William was engaged as an apprentice, and by his application and industry became an expert in the business which he afterwards conducted successfully for nearly fifty years.

After graduating from the Philadelphia College of Pharmacy in

1845, he remained with his employer until 1846 or 1847, when Edward Needles established him in business at Tenth and Spring Garden Streets, where he remained until 1886, when he retired from business. His early religious training was in the Presbyterian Church, to which denomination his parents were attached.

In 1852, he united himself with the Society of Friends, to which religious body he became much attached, and after his retirement from business devoted a large portion of his time and energy to work pertaining to the Society. His religious views were not displayed in words, or by formal professions, but became a part of his daily life, governing his conduct and dealings with his fellow-men.

In 1853, he married Rebecca Turner, of Baltimore, and the subsequent forty years of his life were passed in the congenial society of his wife and four daughters, all of whom survive him.

Convinced in early life of the unchristian character of negro slavery, he was an earnest advocate for the extinction of human bondage, and labored earnestly in the cause at times when courage was required to denounce the system.

In a quiet way he advocated the cause of temperance, discouraging the use of liquor both in public and private life, and by his precept and example was able to extend a reforming influence over this habit. In later life he became a prohibitionist, feeling it to be his duty as a citizen and Christian man to do all in his power to restrict the evils arising from intemperance.

His connection with the College has been one of active and efficient service. He was elected to membership in October, 1857, and in March, 1873, to the Board of Trustees. On the decease of Samuel Bunting in 1890, he was elected unanimously to succeed him as Treasurer of the College, a trust which he held up to the time of his decease, discharging the duties confided to him with carefulness and accuracy.

Although no longer engaged in the practice of pharmacy, he retained a lively interest in the education of those who had made choice of this profession, and devoted a large measure of his time to the educational work of the College.

In 1887 the Degree of Master in Pharmacy was conferred upon him by the College in recognition of his long and honorable service in the profession of pharmacy.

As a pharmacist, he earned a well-deserved reputation for skill

and accuracy, while his conscientious views of the responsibilities of his calling gained for him the confidence of the medical profession as well as that of his brother pharmacists.

Amiable in his intercourse, honorable in all his business transactions, ever ready to acknowledge an error in his judgment, his word was accepted by all who knew him as free from all dissimulation. The boy was father to the man, and in the record of his 70 years we have an example of a successful, useful and honorable life, resulting from habits of industry, self-denial and patient perseverance.

His mental activity was unimpaired, and his desire for active service which would benefit his fellow-men continued as a characteristic trait until the hour when he was suddenly summoned "to cease from his labors."

To some of his friends he was wont, in his latter years, to review the events of his life, and would contrast the habits of the present rising generation with those of his early days. He deprecated the growing ambition of the present rising generation to attain an early fortune, as displacing the motives which render life useful and ennobling.

"'Tis meet that we should pause awhile
Ere we put off this mortal coil,
And in the stillness of old age
Muse on our earthly pilgrimage."

C. B.

RECENT CONTRIBUTIONS TO PHARMACY.

HYDRASTIS CANADENSIS.

Of the alkaloids of this rhizome, hydrastine and berberine have been quite thoroughly studied, but other alkaloidal constituents, while claimed as long ago as 1873, have provoked numerous contradictory statements. A. K. Hale first announced the existence of a third alkaloid in hydrastis, which was isolated from the mother-liquors of the alkaloid hydrastine; Prescott—and later, Burt—confirmed the presence of this new alkaloid and increased our knowledge of the same; H. Lerchen isolated an alkaloid which he called *xanthopuccine*, and which is probably the same as that discovered by Hale; Lloyd and Power, however, doubted the existence of this third alkaloid. In 1888 E. Wilhelm isolated a small quantity of an alkaloid, for which the name *canadine* was proposed, and in 1891 E.

Schmidt announced that this same alkaloid in some quantity had been placed at his disposal by E. Merck, and that it had also been prepared by himself from the rhizome. The investigations carried on by E. Schmidt and some of his pupils during the past ten years enable him to say that, while hydrastine and berberine are the chief alkaloids present, they do not by any means represent the entire alkaloids; the quantities in which these other alkaloids are present in the rhizome are so small that by successive workings of 50 kilos only one of these alkaloids has been prepared in larger quantity; the alkaloid so obtained, very probably identical with that reported by Hale, Prescott, Burt and Lerchen, is called *canadine* in preference to the name xanthopuccine, because the latter name, indicating a yellow color, is erroneous, as neither the alkaloid nor its salts are yellow.

L. Deichmann, working with this alkaloid, furnished as hydrochlorate by E. Merck, pronounced it to be, in all probability, *dihydromethylberberine*, $C_{21}H_{21}NO_4$. After the conclusion of this investigation, a much larger quantity of canadine hydrochlorate was presented by E. Merck to Prof. E. Schmidt, and the investigations of the latter are now to be recorded as published in Arch. der Pharm., 1894, 136–154.

The isolation of the crude canadine is attended with but one difficulty, namely, its minute quantity; one kilo of the rhizome being sufficient to prove that, besides hydrastine and berberine, a third alkaloid is present. Crude hydrastine, obtained by precipitating with ammonia the concentrated decoctions made by extracting the rhizome with water acidulated with acetic acid, is used in isolating the canadine; after washing and expressing the grayish-brown crude hydrastine, it is dissolved in dilute sulphuric acid, filtered, mixed with some nitric acid and set aside for one or two days; the precipitate which is formed is dissolved in hot water and the alkaloid precipitated by adding ammonia; the precipitate is redissolved in dilute mixed with sulphuric acid and nitric acid. These operations are repeated until the precipitate caused by the nitric acid is perfectly crystalline and only shows a faint yellow tinge; from the almost insoluble nitrate the alkaloid is precipitated, which is then purified by crystallization, first from boiling petroleum-ether, later from alcohol The white, acicular crystals so obtained melted at 132–133° C., and had all the characteristics of a definite chemical compound, but by

combustion gave results quite different from those obtained by Deichmann, so that the presence of another alkaloid (containing less carbon) in the material suggested itself. By forming the sulphate, recrystallizing this, then liberating the base and crystallizing from alcohol, the alkaloid was purified so that it now formed white, lustrous needles, melting at 132·5° C., insoluble in water, soluble in alcohol, ether, chloroform, benzol and hot petroleum-ether; exposed to light, it slowly becomes yellow; the alcoholic solution is neutral to litmus and phenolphtalein; this solution, also the solutions of the salts, are lævogyre; the nitrate, hydrochlorate and hydrobromate, especially in presence of an excess of the acids, are difficultly soluble; the sulphate, in being quite soluble, forms an exception to this behavior. The average of a number of combustions of the alkaloid, C 70·60, H 6·31 and N 4·13, and the analysis of its salts, indicate the formula $C_{20}H_{21}NO_4$, isomeric with that of *hydroberberine*. The tests for *canadine* are as follows: H_2SO_4 dissolves it with a yellowish color, slowly taking a reddish tinge, and after long exposure to air the solution becomes milky-turbid; HNO_3 dissolves it with a yellow color; Erdmann's and Froehde's reagents produce a transient, olive-green coloration, changing to brownish-red; vanadin-sulphuric acid dissolves it, forming an olive-green solution, changing to a black-brown. Canadine salts are *not* changed by ferric chloride nor by potassium ferrocyanide as stated by Prescott; in some respects the reactions of canadine resemble those of morphine, hydrastine, oxyacanthine and berbamine: Ferric chloride and potassium ferricyanide produce a blue-green coloration due to the formation of Prussian blue; iodic acid is reduced, liberating iodine; if a little bismuth sub-nitrate be sprinkled on a solution of canadine in strong sulphuric acid, a brown-black color is developed.

Of the salts of canadine the *sulphate*, $C_{20}H_{21}NO_4H_2SO_4$, may be obtained anhydrous in large, colorless, tabular crystals or hydrated with one molecule water in the form of groups of yellowish needles; it was thought at first that there were here the sulphates of two alkaloids, but as in the recrystallization it was possible to get from both salts either hydrated or anhydrous crystals, and as the base separated from both were identical, this idea had to be given up. The *hydrochlorate*, $C_{20}H_{21}NO_4HCl$, is obtained by adding HCl to the solution of the sulphate, when it may separate as a white crystalline precipitate, a translucent gelatinous mass, or more slowly

in small lustrous scales; exposure to light and air slowly develop a yellow color. The *nitrate* $C_{20}H_{21}NO_4HNO_3$ obtained like the hydrochlorate, forms small, lustrous, white scales. Canadine-platinic chloride $(C_{20}H_{21}NO_4HCl)_2Ptcl_4$, is obtained as a yellow amorphous precipitate. Canadine-auric chloride, $C_{20}H_{21}NO_4HCl + AuCl_3$, forms a red-brown flocculent precipitate. Methyl iodide at ordinary temperature unites with canadine, forming pale yellow crystals $C_{20}H_{21}NO_4CH_3I$, which melt at 228–232° C.

The behavior of canadine towards alkaloidal reagents, its change of color when exposed to light, and the fact that the mother-liquors of canadine sulphate exposed to light and air contained berberine sulphate, indicated the close relationship of these two alkaloids; another important observation in this connection was that iodine, acting upon the alcoholic solution of canadine, was decolorized, producing an intensely yellow-colored solution, from which an abundant separation of small yellow crystalline needles was noted after a short time. This deposit of crystals was found to consist of berberine hydriodate and the hydriodate of another base resembling canadine, but melting at 140° C. instead of 132·5° C. These reactions indicate that *canadine* $C_{20}H_{21}NO_4$ is *tetrahydroberberine* (berberine $C_{20}H_{17}NO_4$), and that the base just mentioned may be an intermediate product between canadine and berberine. From the action of iodine upon canadine at 100° C. were isolated golden-yellow, lustrous needles, agreeing in all respects with berberine hydriodate, $C_{20}H_{17}NO_4HI$; from them derivatives were prepared, agreeing in all respects with berberine hydrochlorate and berberine aurichloride. By the action of zinc and sulphuric acid the yellow solutions of the hydrochlorate and hydriodate were nearly decolorized; ammonia separated from these solutions a gray-white, flocculent precipitate, which, after recrystallization from boiling alcohol, was dissolved in chloroform and covered with a layer of alcohol; the crystalline needles first formed were readily transformed into the octahedral form characteristic of hydroberberine, which were found to melt at 166–167° C., thus demonstrating that canadine could be changed into the isomeric hydroberberine.

FRANK X. MOERK.

EDITORIAL.

THE THREE YEARS GRADED COURSE AT THE PHILADELPHIA COLLEGE OF PHARMACY.

The Philadelphia College of Pharmacy has again demonstrated her fitness to lead the institutions devoted to pharmaceutical education in this country, by requiring all who matriculate after this year to take three full courses of lectures. Like all advanced movements, it is not probable that adverse criticism will be escaped. Many of the older graduates will recall the opposition which was made to holding the Commencement in a public hall; but the progressive supporters of the College came to her aid and the opposition was vanquished. On nearly every occasion since, when some improvement has been demanded, the friends of progress could only win the day after strenuous efforts; but, as time wore on, and the College waxed stronger, and the success of the various advanced movements had been proved, ill-considered opposition was driven into the background, until now the College has little difficulty in inaugurating any reform which has been well considered, and which promises beneficial results for the advancement of American Pharmacy.

For many years the College has encouraged students to extend the time for acquiring a pharmaceutical education, by offering to all, the opportunity to attend a third course, without additional expense. The number of students availing themselves of this privilege has increased largely of late years, and it has often embraced some of the best students in the class.

Unfortunately the action of the real student and true lover of knowledge, who had sufficient foresight to realize the value of taking three years to complete his course, was likely to be misunderstood, and the fear of being scouted by his fellows, as too ignorant to accomplish in two years what others had done, deterred many from accepting the privilege. Then, again, a three-years-course student, under the old regime, felt that he was under some disadvantage in coming up for examinations with those members of his class who had failed to pass their examinations after a two years course, and were compelled *by necessity* to take three courses.

These, however, are minor reasons for the advanced step of three full courses; the grand moving cause is that sufficient time cannot be given in two courses, notwithstanding the lengthening of the same, to adequately present to the mind of the student the vast accumulation of facts which Pharmacy and its collateral sciences now embrace. Not only must more time be taken by the student to absorb the facts, but these, even if perfectly memorized, can never be considered to rise to the value of actual knowledge, unless sufficient time has been given for them to be assimilated and digested.

If additional time be the only factor, it might be said, why not lengthen the course, or largely increase the hours for work during each day? But those who advocate such views fail to grasp the importance of allowing the mind of the student sufficient time for that careful thought and deliberate study necessary for thoroughly mastering the vast number of facts now embodied in a knowledge of Pharmacy; by having these continually brought practically before the student and thoroughly examined, from many points of view, outside of the regular college lectures, a mere acquaintance or intellectual assent

soon develops into that actual knowledge which becomes a permanent part of the student's mental equipment.

These views having been practically accepted by the College, it became simply a matter of form for the Board of Trustees at its meeting in April to pass the resolutions which will make the three-years course compulsory after 1894. The College realizes, more thoroughly than ever before in its history, the responsibility involved in taking this important step. It will probably have the effect of cutting down the size of classes, and those who merely measure success by numbers may have an opportunity of quoting their prophecy that the movement was premature; but if the size of the class diminishes, the College will have the proud satisfaction of knowing that the quality has been improved, and the value of its Diploma will be still further enhanced. It is to be hoped that to those who successfully complete their three-years course, a more distinctive and appropriate reward than the title of graduate will be conferred by their Alma Mater. J. P. R.

STATE ASSOCIATION.

Especial attention is called to the notice, in its appropriate place in this number, of the Pennsylvania Pharmaceutical Association. Every pharmacist in the State should attend the meeting, to be held in Reading on June 12th. Pharmacy has never made more rapid strides forward than since the formation of state associations, commenced some fifteen years ago. This led to a reorganization of the American Pharmaceutical Association, at its Cincinnati meeting, in 1887; and that body, becoming more representative, entered a period of usefulness which it had not previously enjoyed.

It is to be hoped that there will be no waning of the enthusiasm which has heretofore characterized the meetings of most state associations.

It is true that the business side of pharmacy has been, and still is, undergoing a change. The advent of the "cutter" has rendered a modification of business necessary. The pharmacist, in order to make a living, has been compelled to do more than blindly hand out the secret preparations of the proprietary manufacturer; he has had to educate himself; this education has, in part, been acquired through attendance at the state association meetings. First local formularies were issued, terminating in the publication of that valuable "National Formulary." The result of all this will be the doom of the "patent medicine." Let no one ignore the value of his state association, but join in, and in helping others he will be helping himself.

GENERAL REGISTER OF THE SILESIAN BOTANICAL CLUB OF EXCHANGE.

This list of exchange botanical specimens has now reached its twenty-sixth year of publication, and is under the directorship of S. Mayer, an apothecary of Mainburg, Lower Bavaria.

The catalogue is made up of a list of botanical specimens for exchange, and of the rules which govern the Society; the latter are given in the German and French languages, side by side.

The object of this Society is to aid botanists in all parts of the world to exchange with one another. No annual dues are charged, but a certain number of specimens are retained by the Society for effecting the exchange; for instance,

out of every hundred, fifteen are retained if they come from localities other than Austria or Germany. From these countries twenty specimens are reserved.

The list offered is a long and valuable one, and would evidently afford any botanist an excellent opportunity to enlarge his herbarium at a very small expense.

The following hints in regard to "Drawings for Illustrations," from Phar. Jour. Trans., 53, 860, so well explain the subject, that they are here reproduced in full:

"The simplest and most generally employed method of illustrating letter-press is by means of zinc blocks prepared by a photographic process from line drawings done with pen and ink. In one of the recent Cantor lectures delivered before the Society of Arts by Mr. Henry Blackburn, it was pointed out that drawings should be made upon bristol board, or paper with a similar surface, with black or Indian ink, that will dry with a dull surface, and a pen having a medium point. The drawings should consist entirely of clean and sharp lines, shading by means of washes being inadmissible. Photographs and shaded drawings are reproduced by a more elaborate process, which does not yield equally satisfactory results in rapid printing. In most cases it is desirable to prepare the drawings on a larger scale (one-third to one-half larger) than it is proposed to reproduce them. Sufficient allowance must then be made for the result of reduction, some lines being necessarily thickened, whilst the amount of reduction intended should be clearly indicated in the margin. In this way it is possible by means of a simple line drawing to efficiently illustrate the text of an article or paper—whether merely describing a piece of apparatus or other object of appreciable size, or representing the magnified image of minute structures as seen under the microscope—and contributors to the Journal are requested to adopt this plan when illustrations are necessary to elucidate the text of their contributions."

It is the desire of the editor of the American Journal of Pharmacy to have illustrations accompany the text, wherever they will aid in explaining it, and clear photographs will be accepted and reproduced. It is much better, however, to have a good artist first make line drawings from these photographs.

On Thursday evening, May 3d, several hundred visitors at the Philadelphia College of Pharmacy examined a display of the specimens from the Martindale Herbarium.

The museum, library and reading-room were filled with improvised tables, so arranged that the specimens placed thereon were of just the right height and angle to be observed by the visitor while standing or walking. In this way the largest possible number of specimens were viewed during the time of the exhibition, from 8 until 11 o'clock.

During the two remaining days of the week the pupils of a number of schools in Philadelphia and vicinity availed themselves of the opportunity to see this collection.

LAVOISIER.

May 8th was the hundredth anniversary of the death of Lavoisier. His tragic death at the hands of the rabble of Paris, and the active part he took during life in founding many of our chemical laws, have made him one of the

most memorable figures in the history of chemistry. Recently the Society of Physics and Medicine at Amsterdam, appointed a committee to suggest and start a movement to commemorate his death.

Dr. Gustavus Hinrichs, of St. Louis, Mo., has undertaken, single handed, to start a movement in this country. He has, through a circular, appealed to his fellow chemists to form a large committee whose mission shall be to take such steps as will secure to the memory of Lavoisier a monument in Paris. Dr. Hinrichs is at present anxious to have names of those willing to serve on such a committee, and anyone interested can obtain more information by addressing him at 3132 Lafayette Avenue, St. Louis, Mo.

The Pharmaceutical Society of Great Britain recently elected Sir Frederick A. Abel, Prof. Joseph P. Remington and Prof. Sidney Ringer honorary members; and Prof. Henry H. Rusby and Dr. George Watt corresponding members.

The name of Charles Rice was inadvertently omitted from the list, in the Journal of last month, of those on whom the Philadelphia College of Pharmacy conferred the honorary degree of Master in Pharmacy at the Commencement in April.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Grundriss der Pharmakognosie. Von F. A. Flückiger. Zweite, mit Berücksichtigung technisch wichtiger Pflanzen bearbeitete Auflage. Berlin, 1894. R. Gaertner's Verlagsbuchhandlung. Pp. 333.

Outlines of Pharmacognosy. Second edition.

The first edition of this valuable work was issued in 1884. This second edition again brings the subject up to date. Each drug is treated in a concise and clear manner, by first giving the name and synonym, then the origin, description and history. Not one word too many is used in briefly summing up the "quintessence" of information. By omitting all references of authority, the author has saved much room and confusion, although it does not aid one who wishes to look up the literature of the subject.

Proceedings of the American Pharmaceutical Association, at the forty-first Annual Meeting, held at Chicago, Ill., August, 1893. Philadelphia. 1893. Pp. 1,087.

The frontispiece of this volume is an excellent portrait of the late Professor Maisch; this is followed by the title page and four pages of a memorial. There is an unusual amount of good, original matter in the book, and an especially valuable Report on the Progress of Pharmacy. This Report is becoming a feature of the Proceedings, particularly as it is supplemented by an extensive bibliography. Two hundred and eighty-six members were registered as attending the meeting. The new members elected, numbered one hundred and thirty, and there were dropped from the roll, on account of death, resignation and the non-payment of dues, ninety-nine, showing an increase in membership, during the year, of thirty-one.

Missouri Botanical Garden. Fifth Annual Report. St. Louis, Mo. 1894. Published by the Board of Trustees. Pp. 166, and 32 plates.

The Director of the Garden, Dr. William Trelease, may be said to be the

author of this interesting and beautiful volume. It is made up of (1) Reports of the Officers and Director; (2) Anniversary Publications; (3) Scientific Papers. The last show considerable care and original research on the part of the authors. Three of the papers are of especial interest and value, viz.: "A Study of the Venation of the Species of Salix described in Gray's Manual, with Reference to their Determination," by Dr. N. M. Glatfelter. "Material for a Monograph on the Tannoids, with Special Reference to Vegetable Physiology," by J. Christian Bay, and "The Sugar Maples, with a Winter Synopsis of all North American Maples," by William Trelease. The Report is published for gratuitous distribution and exchange within certain limits, but may be purchased of the agents, Dr. A. E. Foote, of Philadelphia; W. Wesley & Son, of London, and R. Friedländer & Son, of Berlin.

The Tannins, Vol. II. By Henry Trimble, Ph.M.

A Monograph on the History, Preparation, Properties, Methods of Estimation and Uses of the Vegetable Astringents. J. B. Lippincott Company, Philadelphia. 12mo. Pp. 172.

The first volume, which appeared in December, 1891, was devoted to a general history of the tannins, the methods of extraction and estimation, and especially considered gallo-tannic acid. The second volume, now before us, is especially devoted to the tannins existing in the barks of the various species of oak, the mangrove, the canaigre and in the chestnut. It is an unusually interesting and carefully prepared monograph, treating the subjects in an instructing manner, and serves well as an illustration of the numerous fields in which chemists should specialize their study and investigations.

The first section of the volume treats of the sources of the oak tannins. A very commendable feature of this section is the brief descriptions of the distinguishing characters and well executed sketches of the leaves and acorns of our oaks of the Eastern United States, the barks of which have been generally examined by the author. The suggestion is ventured that a reference to these pages would enable the manufacturers to produce definite products by keeping separate the material and products from the various species of oaks.

The investigations of the author are particularly valuable, and accepted as authority, as in each instance the work was performed on material, the source and botanical origin of which was known, thus removing the uncertainty which attended most of the investigation in this field made in the past.

The second section gives the history of the oak tannins, and the various investigations from 1792 to date are briefly reviewed. The additions to the knowledge of this group are chronicled, and the source of some of the errors introduced in their work is pointed out and attention is directed to the discrepancies existing in the reported results. This concise resumé of the literature will be exceedingly useful to future investigators in the vegetable astringents, as it places in a compact form the information from the various scattered sources, many of which were not accessible to the average student. The various processes of preparation and purification of these tannins, as well as their properties and methods of estimation, are described, accompanied by criticisms, suggestions and improvements, as results of the original investigations of the author. These materially enhance the value of the work. Acetone is recommended as a solvent in the extraction in place of ether. The pure oak tannins

are shown to yield a *green* color with salts of iron, and not a *blue*, as generally stated.

The tannin from the Mangrove bark (*Rhizophora Mangle*, L) is proved to be a catechol tannin closely allied to those of rhatany, canaigre and mimosa.

The seventh section is devoted to Canaigre tannin obtained from the tuberous roots of the *Rumex hymenosepalus* Torr. The author's investigations indicate its close relationship with the tannins existing in mangrove and rhatany. The extensive distribution of this plant in the Southwestern States and Territories and the ease with which it can be cultivated, and the large percentage of tannin contained in the roots, indicate that in the future it will be a valuable source of supply for tanning purposes.

The wood of the American Chestnut is stated to contain 7·85 per cent. of tannin, and the bark 7·31 per cent., and the reactions and elementary analysis point to its probable identity with gallo-tannic acid.

The index of the literature of the tannins continued from the first volume is also exceedingly valuable. The book is commended to those interested in the chemistry of the vegetable products, and especially to those who are practically engaged in the manufacture and application of these products in the industrial arts, such as dyeing and tanning. G. M. B.

Essentials of Practice of Pharmacy, arranged in the form of Questions and Answers. Second edition. By Lucius E. Sayre, Ph.G. Philadelphia: W. B. Saunders. 1894. Pp. 200.

The new Pharmacopœia has made necessary a revision of this work. The author does not claim originality for this work, but an arrangement of pharmaceutical facts designed to give the student and quiz master some variety from the usual classification.

Therapeutic Terms for Pharmacists and Physicians. By H. M. Whelpley. M.D. St. Louis, Mo., 1894. Published by the author. Pp. 68.

Dr. Whelpley found, during his own studies, and while teaching medical and pharmaceutical students "that even large and expensive medical dictionaries failed to furnish definitions for all of the therapeutic terms of current literature." Therefore, he has collected in a handy volume much valuable information in the shape of concise definitions to words in use in pharmaceutical and medical science.

Die Alkalien. Darstellung der Fabrikation der gebräuchlichsten Kali- und Natron-Verbindungen, von Dr. S. Pick, Fabriksdirector. Zweite verbesserte Auflage. Wien: A. Hartleben's Verlag. 398 Seiten.

The Alkalies, description of the manufacture of the most commonly used Potassium and Sodium compounds. By Dr. S. Pick, Factory Director. Second revised edition. Vienna: A. Hartleben's Publishing House. Pp. 398.

The Hartleben Library, a series of technical chemical hand-books of portable size, has now reached Vol. 208, and covers a wide range of the applications of chemistry to the useful arts. The volume above quoted is one of the earlier of those which appeared a number of years ago, and has now been re-written and brought up to date. An examination of its pages shows that this has been done with reasonable fullness. Castner's improvements in the manufacture of metallic sodium have been included, and the account of the ammonio-soda

process and its more recent modifications, is quite satisfactory. We do not find anything, however, with regard to the recently proposed methods for the electrolytic preparation of caustic soda. It is true that these methods have hardly passed beyond the experimental stage as yet, but the chemical journals have for the past year or two contained abundant accounts of them. Under potassium chlorate, however, we find a recent electrolytic method, now in operation in Switzerland, described. A comparison of the hydrometer scales in current use is appended. The work forms a satisfactory reference book, moreover, in that it refers frequently to the original sources of information in journal literature.

S. P. S.

Chemisch-technische Specialitäten und Geheimnisse mit Angabe ihrer Zusammensetzung nach den bewährtesten Chemikern, von C. F. Capaun-Karlowa, Apotheker, u. s. w. Dritte vollständig umgearbeitete, vermehrte und verbesserte Auflage. Wien: A. Hartleben's Verlag. 252 Seiten.

Technical-chemical specialties and secrets, with a statement of their composition according to chemists of authority. By C. F. Capaun-Karlowa, Apothecary, etc. Third, completely re-written, enlarged and improved edition. Vienna: A. Hartleben's Publishing House. Pp. 252.

This work is like the volumes of chemical recipes and secret preparations that appear from time to time. It is alphabetically arranged, and includes such subjects as varnishes of all kinds, cements, alloys, flavoring essences, explosive mixtures, inks and similar preparations.

Such works have a rather restricted value, as the local conditions and names of these special preparations vary very greatly, and they rapidly pass out of use and are replaced by fresh novelties and patented articles.

The work has been brought down to date, and probably has value as a convenient reference book, fitted to the German conditions of to-day. S. P. S.

Semi-Annual Report of Schimmel & Co. Leipzig and New York. April, 1894. This pamphlet contains the statistics, prices and other commercial information in regard to essential oils, and also a fair amount of results of original research. A number of new oils have been prepared and examined by the firm; notably, those from mignonette root, golden rod, red cedar and grape fruit or shaddock.

Analyse bactériologique et chimique des eaux. Par A. Denæyer. Brussels, 1894.

Bacteriological and chemical analysis of water.

Les peptones: leur composition, leur analyse. Par A. Denæyer. Antwerp, 1894.

Peptones: their composition and analysis.

Vierteljahresschrift über die Fortschritte auf dem Gebiete der Chemie der Nahrungs- und Genussmittel. Achter Jahrgang. Viertes Heft (1893). Berlin, 1894. Verlag von Julius Springer.

The Oils and Oleoresins of the U. S. Pharmacopœia, 1890. A tabular statement compiled by Albert N. Doerschuk, Ph.G.

This table is printed on one sheet of heavy paper, 11 x 22, and contains much valuable information. Copies may be obtained at a nominal price by addressing Dr. H. M. Whelpley, care of Myers Brothers, Druggists, St. Louis, Mo.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, May 15, 1894.

The meeting was called to order, Professor Trimble nominating Joseph W. England, Ph.G., as chairman.

The minutes of the last meeting were read and approved.

The Registrar presented, on behalf of Mr. John A. Pemberton, Prof. Asa Gray's work, "How Plants Grow."

Prof. E. S. Bastin read a very instructive and interesting paper, upon "Economic Botany," which he defined to be botany applied to the wants and uses of mankind. This is very fully illustrated in the adaptation and improvement of plants for food through the labors of scientific botanists.

In pharmacy we notice this remarkably in the Cinchonas of India, which are two or three times as rich in alkaloidal constituents as when first found in their native regions. The paper is published on p. 282, of this number.

The next paper was one on "Lead in Tartrates," as a continuation of the subject of "Lead in Citrates," which was read a few meetings since; as tartaric acid is rarely found in the original crystalline state in commerce, but nearly always in powdered form, the impurity is not so easily detected by physical means. Lead left in contact with a solution of tartaric acid will show evident signs of it in twelve hours. Rochelle salt is nearly always extremely pure, and in cream of tartar there is merely a trace; in Seidlitz powders the contents of the blue paper is nearly pure, while the white occasionally is tainted with lead; if possible, it should be eliminated entirely, as lead is a cumulative poison, and is not thrown off by the system.

Prof. Trimble read a paper upon "Four Oak Barks from India."

Mr. England called attention to a specimen of our American Carbolic Acid, which was snow white when first obtained, but on exposure in a glass container to the air, it became quite discolored.

A specimen of Japanese Camphor was exhibited, which was of much denser structure than that refined in America, said to be occasioned by the sublimation being conducted at a higher temperature.

"Glassine" labels were exhibited; being celluloid, it was feared that alcoholic and ethereal solutions would be very hurtful to them.

Sublimated peat, an article made in Holland, but sold in Paris. It is peat well cleaned and then treated with a weak solution of mercuric chloride. It is preferable to Oakum, as it is less stimulating.

An imitation Coffee was exhibited; the composition was said to be Rye flour, Chicory, Clay, Molasses, and the seller stated that when mixed in proportion of 25 per cent. with true Coffee it cannot be distinguished. It is quite similar to some exhibited a few years since at one of the pharmaceutical meetings. The industry has recently been revived.

Mr. Thompson, in a paper, called attention to the inferiority of the Oak wood now in the market, and that of some hundred years ago.

On motion, all the papers were referred to the publication committee.

Prof. Trimble exhibited, without recommendation, a poison bottle of such device (representing a human skull) that it was thought it might prevent the contents being misused. The sentiment of the meeting, however, was opposed to the idea of an odd-shaped bottle preventing mistakes.

A sample of Emplastrum Ammoniaci Cum Hydrargyro was exhibited, in which the mercury had amalgamated with the tin of the container, and, of course, rendered the preparation of little value.

This being the last meeting of the series, a new committee was to be appointed, and the Chairman was asked to name, which he did: Wallace Procter, Wm. L. Cliffe, C. B. Lowe, Jos. W. England, Geo. M. Beringer, and Henry Trimble, Chairman.

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The Scientific Section of the American Pharmaceutical Association urgently requests members to inform the Committee as to the subjects upon which they will write, and to send their papers ready for printing to the Chairman not later than June 30th.

The Committee would suggest a number of papers upon the following: Does practical experience with the New Pharmacopœia prove the processes therein contained to be the best?

L. E. SAYRE, *Chairman*, Lawrence, Kan.
CHAS. M. FORD, *Secretary*, Denver, Col.
F. S. HERETH, *Associate Member*, Chicago, Ill.
Committee.

PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

The Seventeenth Annual Meeting of this Association will be held in the Neversink Mountain Hotel, near Reading, on the 12th, 13th and 14th of June, 1894, the first session commencing on Tuesday, June 12th, at 3 P.M.

The Neversink Mountain Hotel is built on the crest of the Neversink Mountain, at an elevation of 1,200 feet above the sea level, and is a very delightful summer resort. To reach the hotel from the railroad station, electric motor cars run directly from Ninth and Penn Streets to the hotel. The charge for entertainment in the hotel will be $2.25 per day. Good rooms can be secured by writing early for them to Mr. John B. Raser, Local Secretary, Reading, Pa.

Orders for tickets at excursion rates on the Pennsylvania Railroad and Philadelphia & Reading Railroad can be had upon application to the Secretary.

The Committee on Entertainment has made arrangements for musical and other entertaiments for each evening during the meeting, and also for a trip over the mountain railroad.

J. A. MILLER, *Secretary*, Harrisburg, Pa

MISSOURI PHARMACEUTICAL ASSOCIATION.

The Annual Meeting of this Association will be held at Excelsior Springs, Mo., June 12th to 16th, 1894. A feature of the meeting will be a number of prizes for papers, exhibits and debates. Further information can be obtained of Dr. J. C. Falk, 1112 Franklin Avenue, St. Louis.

OHIO PHARMACEUTICAL ASSOCIATION.

The Annual Meeting has been postponed from May 22d to June 5th, and will have headquarters at the Grand Hotel, Cincinnati. A reception, an evening concert and an excursion will be features of the occasion. Albert Wetterstroem, Local Secretary, 435 Colerain Avenue, Cincinnati.

INDIANA PHARMACEUTICAL ASSOCIATION.

The Thirteenth Annual Meeting will be held at Evansville, June 13th and 14th. An interesting programme has been arranged, including addresses by J. U. Lloyd, C. L. Diehl, J. N. Hurty, A. L. Green and C. T. P. Fennel.

PENNSYLVANIA PHARMACY BOARD.

The State Pharmaceutical Examining Board of Pennsylvania held an examination in the Girls' High School at Harrisburg, on Saturday, April 28, 1894.

Two hundred and seventy-two candidates appeared for examination, one hundred and sixty-five applying for registered Pharmacists' Certificates, and one hundred and seven for Qualified Assistants' Certificates. One hundred and nine of the former, and eighty-five of the latter class were successful.

The next examination will be held at Williamsport in July. Applicants for examination should apply to the Secretary of the Board, Charles T. George, Harrisburg, Pa., after the middle of June, for the necessary blank form of application, and the exact time and place of the examination. Applicants should always state, when applying for blanks, for which certificate they wish to be examined.

VIII INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY,

Under the High Patronage of His Imperial and Royal Apost. Majesty of Austro-Hungary.

To be held at Budapest, from the 1st to the 9th of September, 1894.

DEPUTY PATRON, HIS IMPERIAL AND ROYAL HIGHNESS ARCHDUKE CHARLES LOUIS.

Secretary-General: Prof. Dr. C. Müller, Rochus Hospital.

The Organizing Committee of the Eighth International Congress of Hygiene and Demography, to be held at Budapest, from the 1st to the 9th of September, this year, have created a special section for pharmacy, within this Congress' sphere of action.

Our profession will for the first time be represented at the Congress of Hygiene and Demography.

The success of this section can only be secured by the hearty co-operation and moral support of all our colleagues in the pharmaceutical profession. I therefore call upon all our colleagues and upon those belonging to kindred branches of pharmacy, to assist the scientific activity of our section by contributing papers or by delivering lectures.

For the information of all interested, I subjoin here, at the end of this communication, the working programme of the section, observing only that it is not an exhaustive programme, but that the section desires to have these questions discussed at any rate. It is even very desirable that as many as possible may come forward to deliver lectures on so called free questions, not contained in this programme, which are intended to supplement the questions of the programme. As themes for such lectures, practical as well as scientific questions may serve, which, however, at any rate, ought to be of general interest. Such questions may belong to pharmacy or to branch sciences connected with pharmacy, chemistry, pharmacognosis, botany, pharmaceutical technics, etc.

Notice is to be given of intended lectures not later than the end of April

next to the Secretary-General of the Congress (Budapest, St. Rochus Hospital), or to the President of the Section (IV Zöldfa utcza-Budapest), who signs this communication, and who will be most happy to furnish any information desired.

For the XIXth (Pharmaceutical) Section of the VIIIth International Congress of Hygiene and Demography.

DR. JULIUS JARMAY,
President of the Section.

Budapest, March 12, 1894.

PROVISIONAL PROGRAMME OF THE XIXTH SECTION.

Pharmacology.

President, Dr. F. Jármay; Honorary Presidents, Dr. Arp. Bókai, Dr. Chrl. Kiss, Dr. Alb. Lengyel, Chl. Thán, Dr. L. Tóth, J. Török; Secretaries, Dr. S. Fischer, Dr. J. Kóssa, Dr. St. Moldoványi, A. Török.

The foreign honorary presidents will be elected by the Executive Committee, as soon as it is known who of the foreign celebrities intend to take part personally in the Congress.

QUESTIONS.

I.

(1) International pharmacopœia.
(2) Qualification of druggists (apothecaries).
(3) System of control for the free establishment and control of druggist-shops.
(4) In what manner would it be possible to reduce the prices of medicine so as to make them cheap for the poorer classes, especially for the rural population?
(5) Latest notes on the keeping and preserving of drugs.

II.

(1) The dispensation of drugs or medicines by physicians.
(2) The proper regulation of State control over druggist shops.
(3) The sanitary evils arising from the selling of medicines of which the composition is kept secret.
(4) The definition of herbs and the anatomical parts of herbs, as contained in the pharmacopœia.
(5) The appropriate fitting up of the several parts of apothecary's premises.
(6) The comparison of the quantitative analytical methods, as contained in the different pharmacopœias.
(7) The rational denomination of new drugs.
(8) The drugs of ancient and of present times.
(9) Incompatible drugs.
(10) Explosive compositions of medicine.
(11) International unity for maximal doses.
(12) Uniformity of the form of prescription.
(13) The permanganate of soda as the antidote of phosphorus.
(14) Should the apothecary be examiner of food, drinks and other articles of consumption?
(15) Tokaj-wine as a remedy.
(16) Of the preparations of quinine and of the quantitative determination of pure quinine.
(17) The newest apparatus necessary for the examination of drugs.
(18) Introduction and making known of Hungary's medical plants.

(19) The limits of sensibility in the more important reactions as prescribed in various pharmacopœias.

(20) The determination of all the active parts of the more important tinctures and extracts.

(21) Color blindness amongst druggists and apothecaries.

The Oklahoma Board of Pharmacy.—The Oklahoma Board of Pharmacy held its regular quarterly meeting for the second quarter of 1894, on April 3d, at Perry, and the following were successful in acquiring the required 75 per cent., and were registered :

Edith Ford, Chandler ; John H. Smith, New Ponca ; A. B. Webber, Pawnee ; Thos. L. Neal, Edmond ; Eugene Watrons, Enid.

Also three others were registered by virtue of being graduates of recognized schools of pharmacy :

Wm. L. Rowland, Langston ; Wm. R. McGeorge, Stillwater ; C. B. Highbargin, Enid.

There were thirty in attendance for examination ; but, as will be noticed by the number who passed satisfactorily, a large percentage of those taking the examination seemed to forget that to register as a pharmacist that there would, in fact, be an examination as to proficiency, and have not been brushing up. It is our purpose to raise the standard of pharmacy in Oklahoma, and as the law is intended, place a safeguard around the people from the uncertain and unintelligent dispensing of medicine.

The next meeting will be held at Enid, on the first Tuesday in July, 1894.

C. P. WICKMILLER, *Secretary.*

KINGFISHER, April 9, 1894.

The Georgia Board of Pharmacy met in Americus, May 7th, to examine candidates for druggist, apothecary and pharmacist's license. The percentages required were, respectively, 65, 75 and 85. At this meeting the Board also awarded the prize memberships in the American Pharmaceutical Association. The Board held over and attended the meeting of the Georgia Pharmaceutical Association, which assembled there on the 8th and 9th of May.

DR. HENRY R. SLACK, *Secretary*, Lagrange.

OBITUARY.

Professor Robert Bentley, of London, died on December 24, 1893. He was born in 1821. He was associated with the Pharmaceutical Society of Great Britain, from the time of its foundation, first as student, and then as Professor of Botany until 1887, when he was elected Emeritus Professor. In 1866 he was elected President of the Pharmaceutical Conference at Nottingham. For many years he acted as chairman on the Garden Committee of the Royal Britannic Society, Regent's Park, and annually gave the fellows a course of lectures on botany. Outside of the Pharmaceutical Society, Professor Bentley occupied the Chair of Botany and Dean of the Medical School at King's College, and the Chair of Botany at the London Institution. His "Manual of Botany" passed through several editions, the last, in 1887, being the most complete.

Professor Bentley was probably best known in this country through Bentley and Trimen's "Medicinal Plants." This work has been, and will continue to be, a standard authority in America. On account of the elaborate colored plates, however, its expense places it beyond individual libraries, but it is none the less sought after and consulted.

Hugo Wm. Conrad Martin was born at Fond du Lac, Wis., March 8, 1853.

At the age of seventeen he entered the employ of Huber & Co., of Fond du Lac, remaining with them for three years.

He went to Chicago in 1873, and clerked for L. Schreiber, and afterward with C. M. Weinberger. Mr. Martin graduated from the Chicago College of Pharmacy in 1875, and after graduating joined the College, becoming one of its most active members.

He was married on May 4, 1878, to Miss Lena Amelia Kirchner.

In the summer of 1879, Mr. Martin opened a pharmacy at State and Harrison Streets, where he continued in business until his death.

He served two terms as a Trustee of the Chicago College of Pharmacy, resigning in 1892 to enter the Faculty as Director of the Dispensing Laboratory, a position he occupied until his death.

An earnest advocate of organization, he led the local druggists in their fight against the telephone companies, and later against the "cutters."

He was a member of the Am. Ph. Assoc., and for one year the Secretary of the Ill. Ph. Assoc. An efficient and popular instructor, an aggressive and enterprising pharmacist and a thorough gentleman, Prof. Martin leaves hosts of friends to mourn his untimely decease. He died Sunday, April 29th, after a short illness, of appendicitis. He was buried in Gracelan Cemetery with Masonic rites. He leaves a wife and two children.

BOSTON, April 4, 1894.

At a special meeting of the Boston Druggists' Association, held this day, for the purpose of taking appropriate action upon the death of William J. Cutler, the following resolutions were presented and unanimously adopted by a rising vote :

Resolved, That as members of the Boston Druggists' Association, as well as on behalf of the trade which we represent, we desire to place on record our appreciation of the life and character of William J. Cutler, a member of this Association from its organization, and at one time its President.

That we recognize the comprehensive and executive ability which characterized his faithful devotion to the public and private interests of his calling for more than sixty years.

That we gratefully bear witness to his firmness of purpose ; his ready friendliness and helpfulness to others ; his courtesy ; his absolute integrity, and his spotless character.

That we tender to Mr. Cutler's family our sincere sympathy in a sorrow which we share with them.

That a copy of these resolutions be furnished to Mr. Cutler's family and to the Press.

The following gentlemen were appointed a committee to attend the funeral of Mr. William J. Cutler : Mr. Thomas Doliber, Mr. Joseph Burnett, Mr. Nathaniel J. Rust and Mr. Gorham D. Gilman.